

Milltown Reservoir Sediments Cleanup

Informational Public Meeting

Tuesday, October 14, 2008

Bonner School Gym



Welcome!

Tonight's Meeting

- Impacts after the Breach
 - Sediment Scour
 - Water Quality – surface and groundwater
 - Fishery and Aquatic Life
 - 2009 Mitigation
- Remediation progress
 - Dam and Sediment Removal
 - Bridges
 - Wells
- Restoration and Redevelopment
- Overall Schedule

Important Points

- **It's safe to swim in the Clark Fork River.** Being exposed to CFR water while swimming does not pose a risk to people or pets. Arsenic levels are low.
- **It's safe to recreate along the banks of the Clark Fork River.** Playing at beaches, fishing, or other exposure to sands and sediments deposited downstream of former Milltown Dam does not pose a risk to people or pets. Arsenic levels are low.
- **It's safe to eat fish from the CFR.** Arsenic doesn't accumulate in fish, haven't seen signs of damage to fish from copper. There are other concerns about fish that are not related to this project. As with other rivers and lakes, limit consumption of older fish due to mercury.
- **The fishery is doing better than expected below the former dam** and there has been no change/impact below the Bitterroot. Increases in fish numbers above the CFR
- **Missoula's water supply is safe. Arsenic levels are dropping in monitoring wells near the site,** indicating improved groundwater quality --- the primary reason for all this work: cleanup the local drinking water supply. No increases in Arsenic downstream of site.

Spring 2008

- Completed infrastructure in project area to prevent contaminated sediments from scouring downstream
 - Bypass channel
 - Flood berms
- Timed Dam breach to minimize impacts on aquatic life
- Breached Dam on March 28th –lowered river 15 feet
- Removed 50,000 tons of additional sediment from banks adjacent to powerhouse cofferdam
- 3-4 year flows this spring; highest flow since 1997
- Sustained flow; median flow or more for 34 days
- Cool temperatures this spring and early summer brought sustained flows and low water temperatures.

Slide from March 2008 Public Meeting

Breach: Short-term Impacts to Aquatic Life

- Almost 300,000 tons of sediment (primarily clean from the BFR) will scour downstream
- Sediment will cause additional stress on the fishery and cause a decline in fish populations (primarily down to the Bitterroot River)
- Primary route of mortality will probably be increased bacterial and fungal infections during high temperature periods (July and August)
- Macro-invertebrates will be impacted because of the sediment, primarily sand, filling the spaces between cobble and gravels

What do we focus on for risk?

To determine if there are risks to fish and aquatic life:



- Look at dissolved copper and TSS
 - Copper – it's toxic to fish in tiny amounts
 - TSS – too much sediment in water can suffocate fish
- Monitoring results:
 - Copper was below construction standards
 - TSS exceeded only on the day of the dam breach
 - Below standards ever since

What do we focus on for risk?

To determine if there is a risk to public health from drinking water:



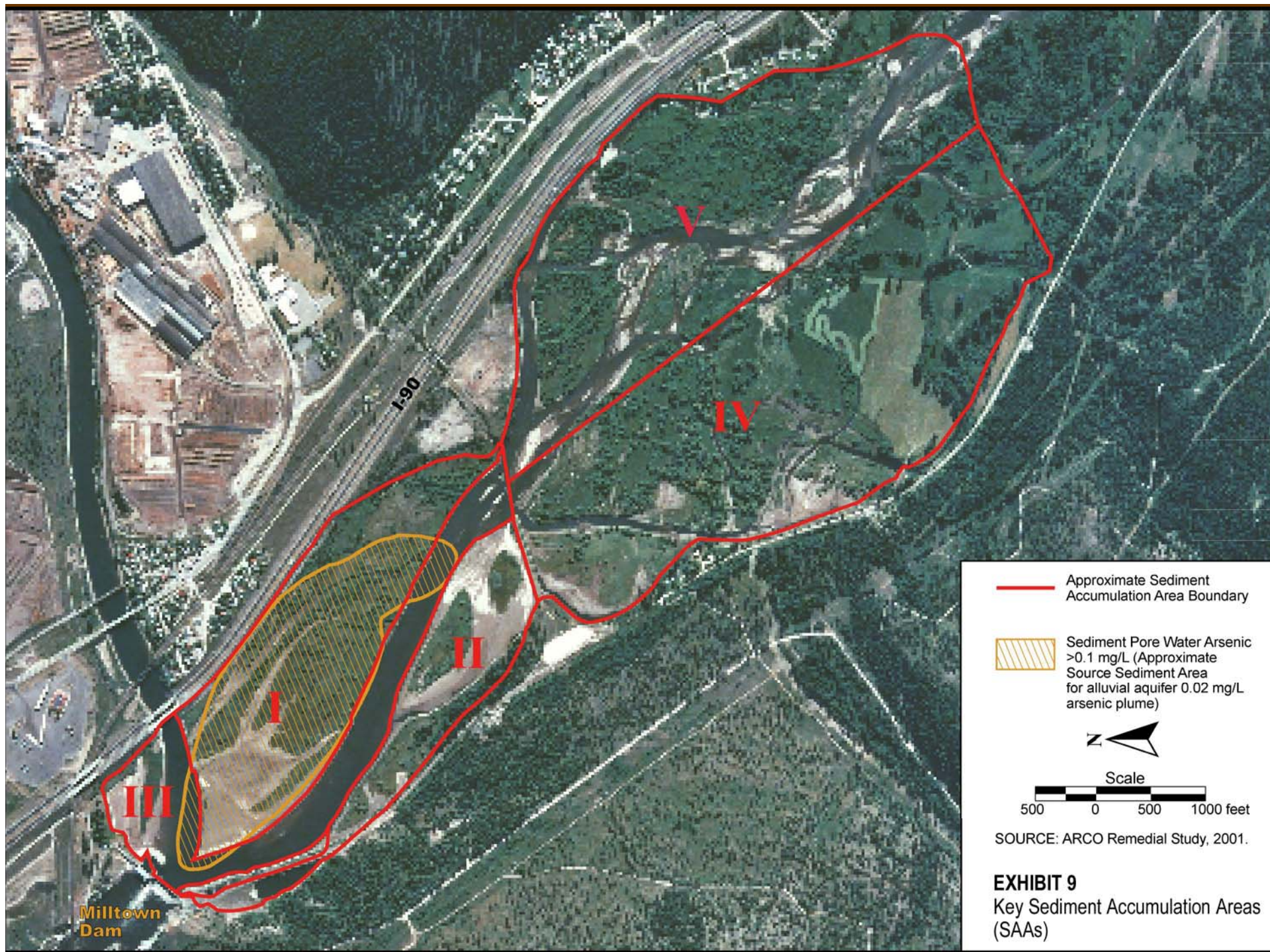
- Look at dissolved arsenic in river and in drinking water wells
- Results:
 - Arsenic has been below drinking water standards (except for the day after the breach)
 - Arsenic levels are decreasing in wells

What do we focus on for risk?

To determine if there is a risk to public health from river recreation:

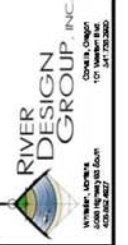
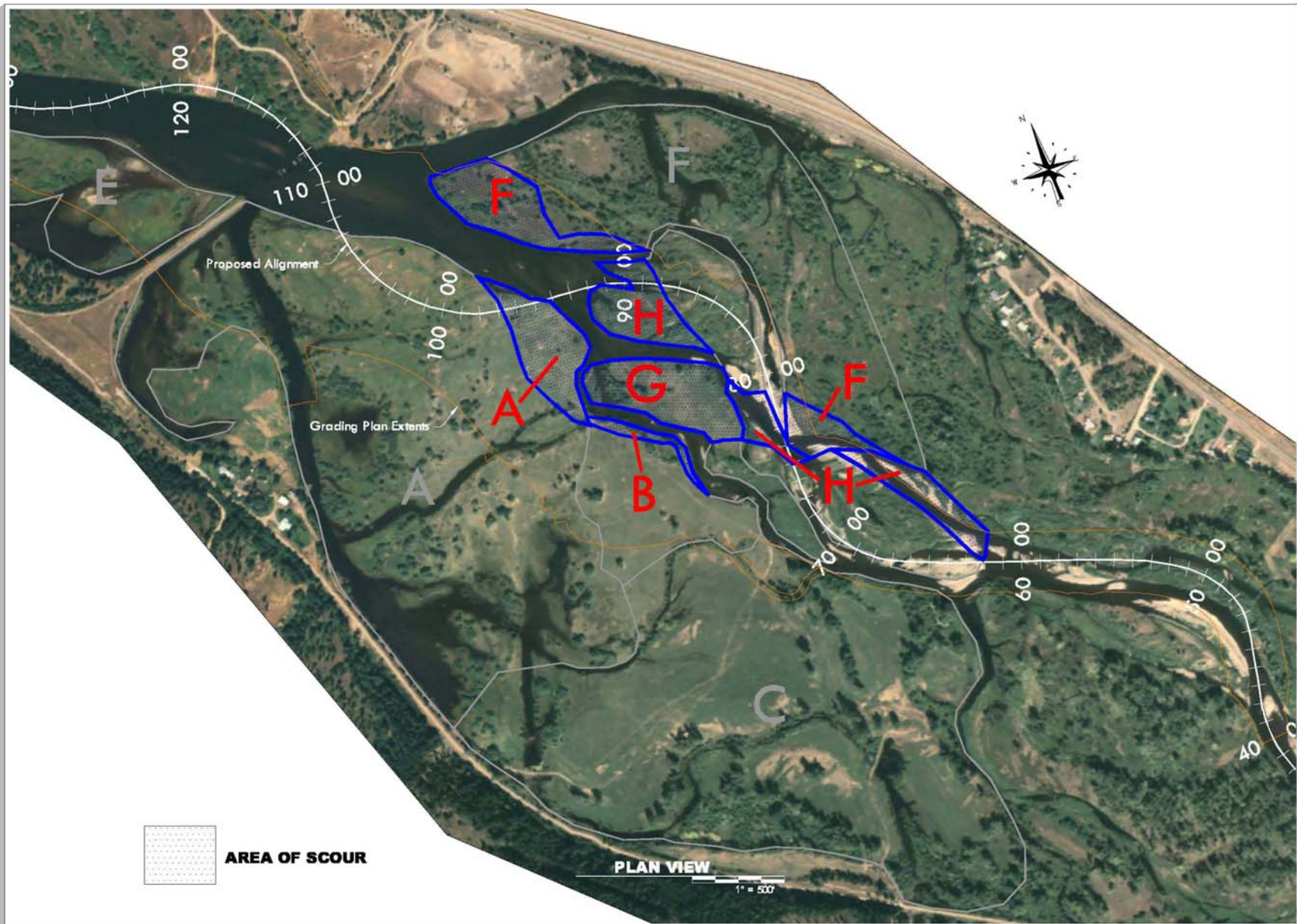


- Look at total arsenic in riverbank sediment
- Results
 - Much lower than health-based standards
 - 6 – 21 ppm from confluence of Clark Fork and Blackfoot Rivers downstream to the Bitterroot River
 - Less than 5 ppm downstream of Bitterroot River



After the Breach – what happened?

- Sediment Scoured from Entire Project Area
 - Total predicted: 300,000 tons
 - Actual: 371,000 tons scoured (23% more)
- Where did material scour from?
 - Remedial Project Area: 163,000 tons
 - SAA 4 & 5 (area upstream of Duck Bridge):
 - State predicted 50,000 tons
 - EPA estimate of actual scour: 208,000 tons
 - State LIDAR estimate of actual scour: 210,000 tons (150,000 tons is sediment; 60,000 tons alluvium)
 - Scoured amount represents about 6% of area sediments



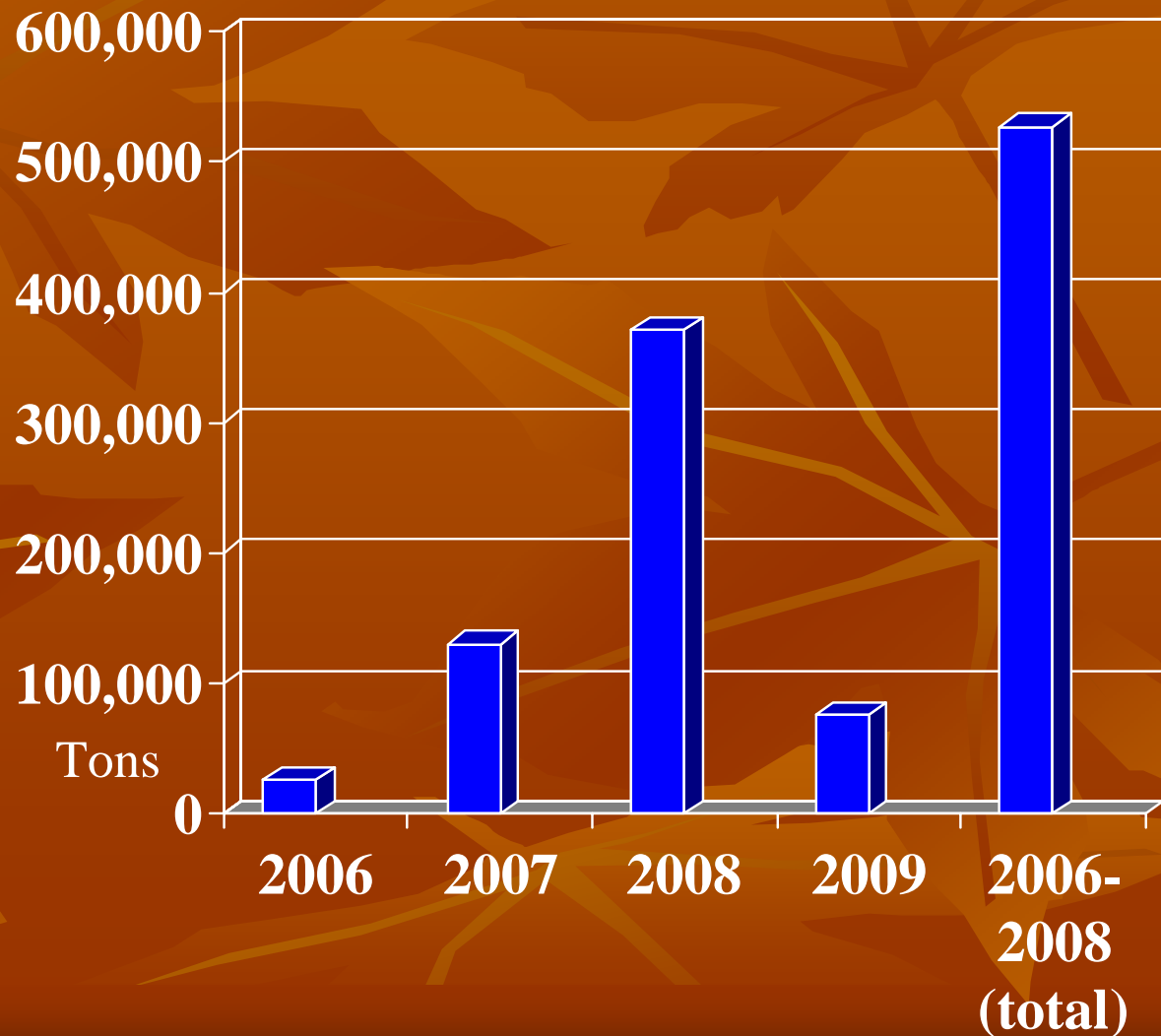
PLAN VIEW 10-3-08
NOT FOR CONSTRUCTION
CLARKFORK RIVER

NO.	DATE	BY	REVISION/DESCRIPTION
1	10/3/08	NMW	EXISTING SURFACES

FILE NAME: Ldar
 PROJECT NO: RDG 08 030
 SHEET XS-1

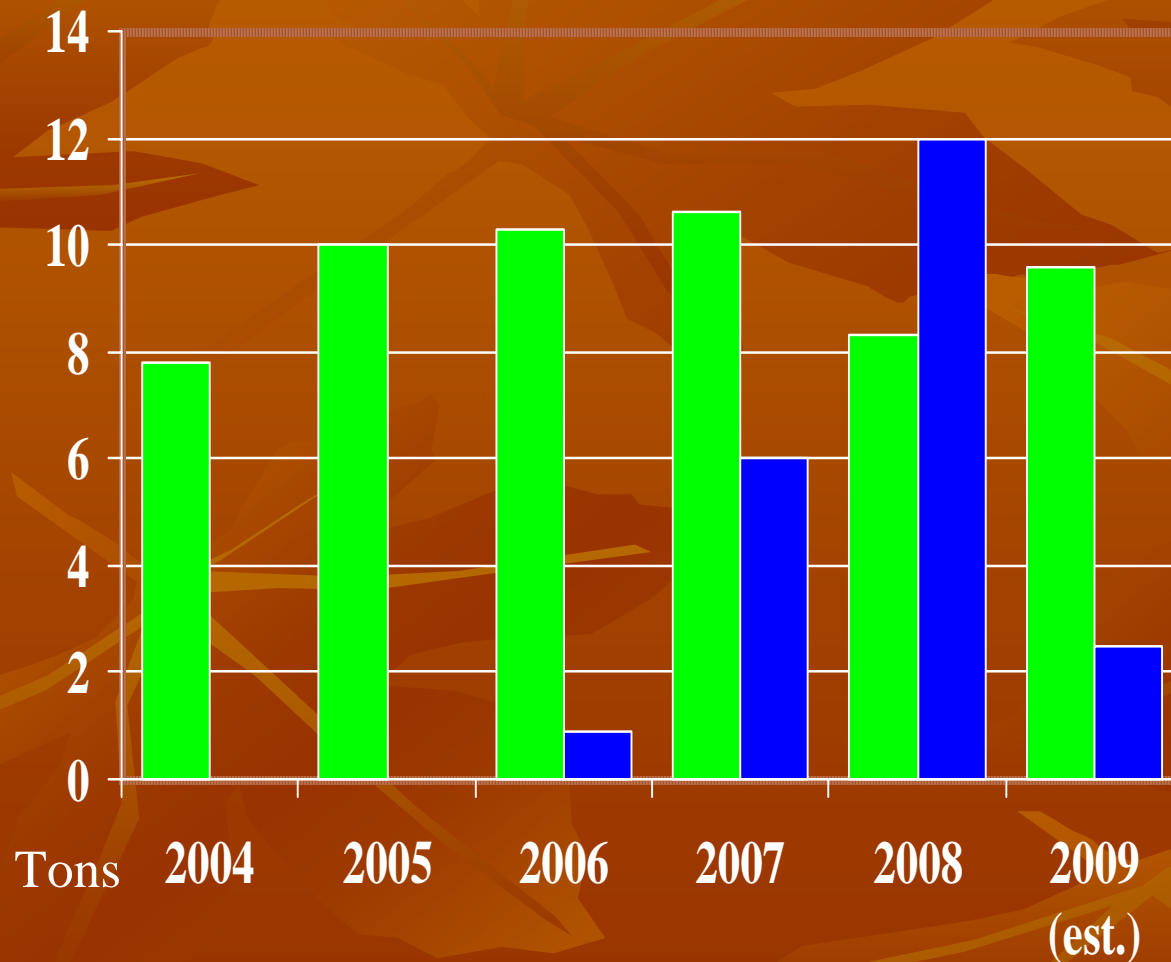
Scouring – Big Picture

- Expected about 603,000 tons* of scouring in the 4 high flow periods during project construction
- To date, 87% of the material expected to scour has already scoured
- The remaining 76,000 tons may scour in 2009



*Measured as suspended sediment

Arsenic Loading from Upper Clark Fork and Blackfoot Rivers Compared to Project Area Scour



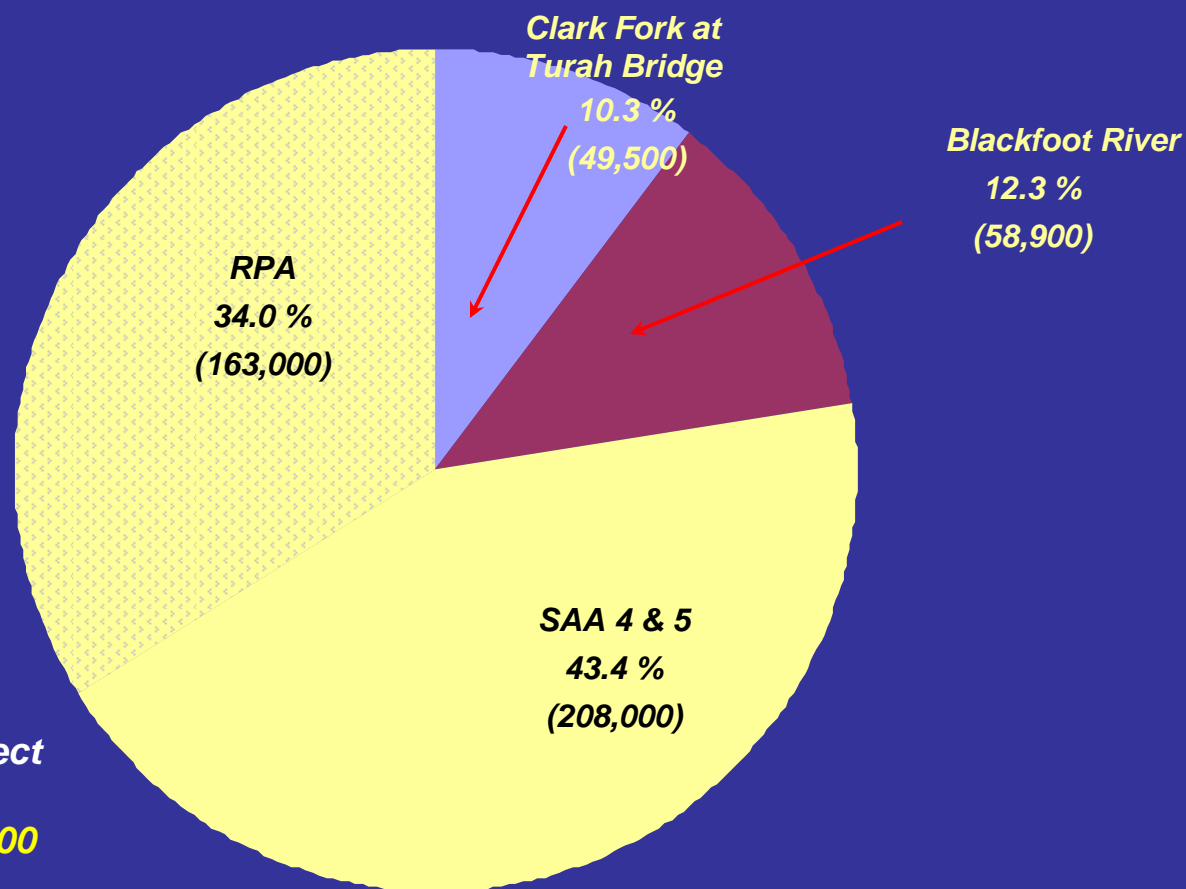
- As part of the cleanup, 1,000 tons are being removed from reservoir
- Originally predicted a total of about 10 tons to be transported downstream from scouring
- Each year about 10 tons are transported down the Clark Fork River naturally
- We expect a total of about 21.4 tons of Arsenic from the project area

ESTIMATED TRANSPORT THROUGH THE PROJECT AREA AND RELATIVE CONTRIBUTIONS FROM UPSTREAM SOURCES

(MARCH 28 THROUGH JUNE 30, 2008)

ESTIMATED CUMULATIVE **SUSPENDED SEDIMENT** LOAD FOR PERIOD (in tons)

Estimated suspended sediment load at Clark Fork above Missoula (USGS 12340500): **479,000 tons**



Total contribution from project area [Remedial Project Area (RPA) and SAA 4 & 5]: **371,000 tons (77.4%)** (There is substantial uncertainty in the apportionment of this contribution between RPA and SAA 4 & 5)

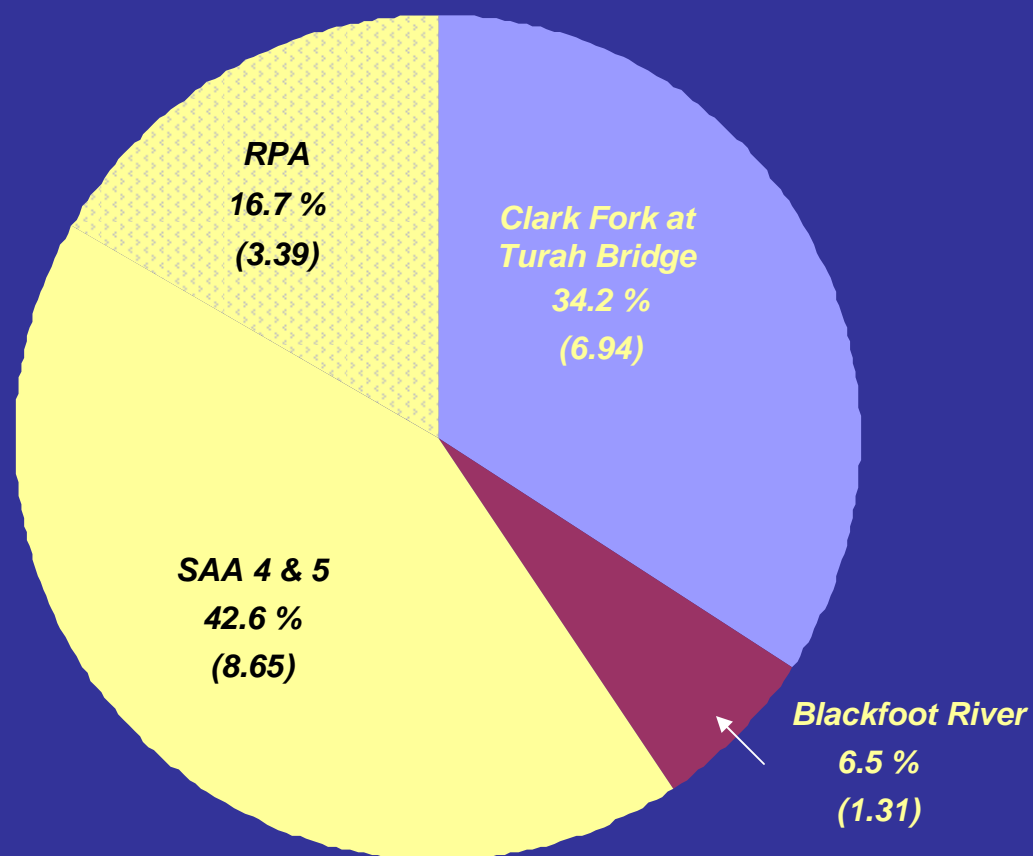
**PROVISIONAL INFORMATION;
SUBJECT TO REVISION**

ESTIMATED TRANSPORT THROUGH THE PROJECT AREA AND RELATIVE CONTRIBUTIONS FROM UPSTREAM SOURCES

(MARCH 28 THROUGH JUNE 30, 2008)

ESTIMATED CUMULATIVE **ARSENIC** LOAD FOR PERIOD (in tons)

Estimated arsenic load at Clark Fork above Missoula: **20.3 tons**



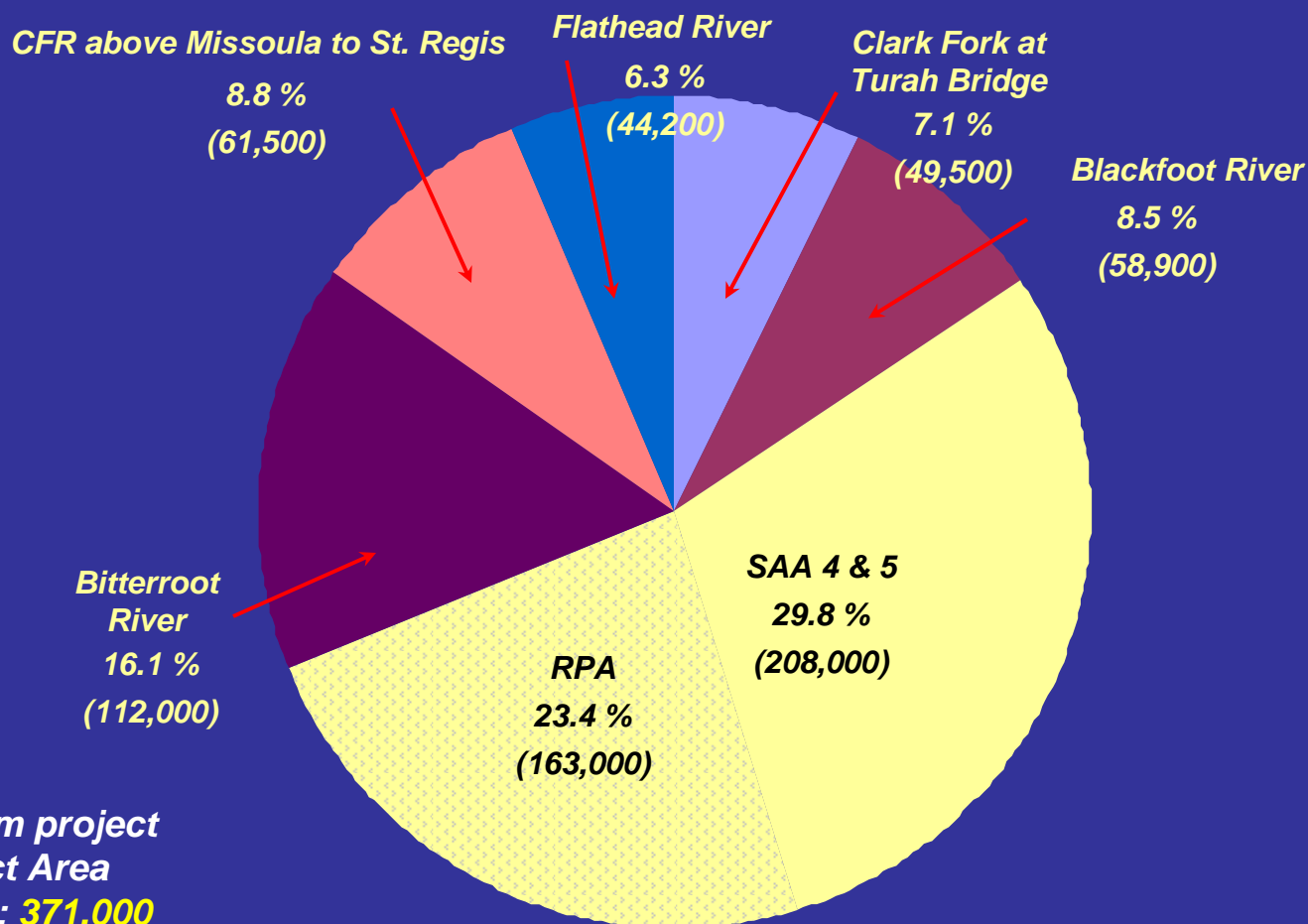
Total contribution from project area [Remedial Project Area (RPA) and SAA 4 & 5]: **12.0 tons (59.3%)**
(There is substantial uncertainty in the apportionment of this contribution between RPA and SAA 4 and 5)

**PROVISIONAL INFORMATION;
SUBJECT TO REVISION**

ESTIMATED TRANSPORT TO THOMPSON FALLS AND RELATIVE CONTRIBUTIONS FROM UPSTREAM SOURCES

(MARCH 28 THROUGH JUNE 30, 2008)

ESTIMATED CUMULATIVE **SUSPENDED SEDIMENT** LOAD FOR PERIOD (in tons)
Estimated suspended sediment load to Thompson Falls: **697,000 tons**



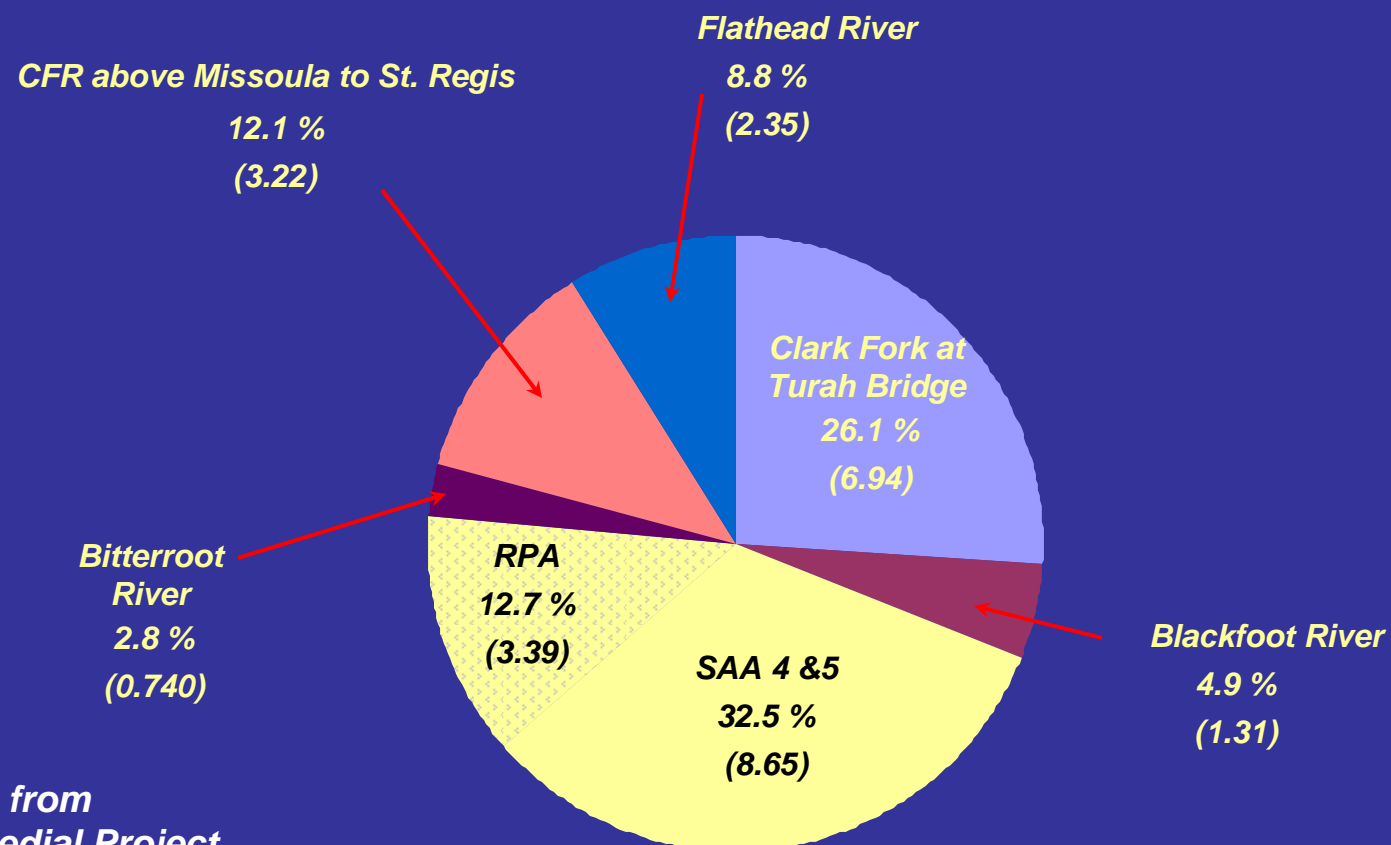
Total contribution from project area [Remedial Project Area (RPA) and SAA 4 & 5]: **371,000 tons (53.2%)** (There is substantial uncertainty in the apportionment of this contribution between RPA and SAA 4 & 5)

**PROVISIONAL INFORMATION;
SUBJECT TO REVISION**

ESTIMATED TRANSPORT TO THOMPSON FALLS AND RELATIVE CONTRIBUTIONS FROM UPSTREAM SOURCES

(MARCH 28 THROUGH JUNE 30, 2008)

ESTIMATED CUMULATIVE **ARSENIC** LOAD FOR PERIOD (in tons)
Estimated arsenic load to Thompson Falls: **26.6 tons**



Total contribution from
project area [Remedial Project
Area (RPA) and SAA 4 & 5]:

12.0 tons (45.2%)

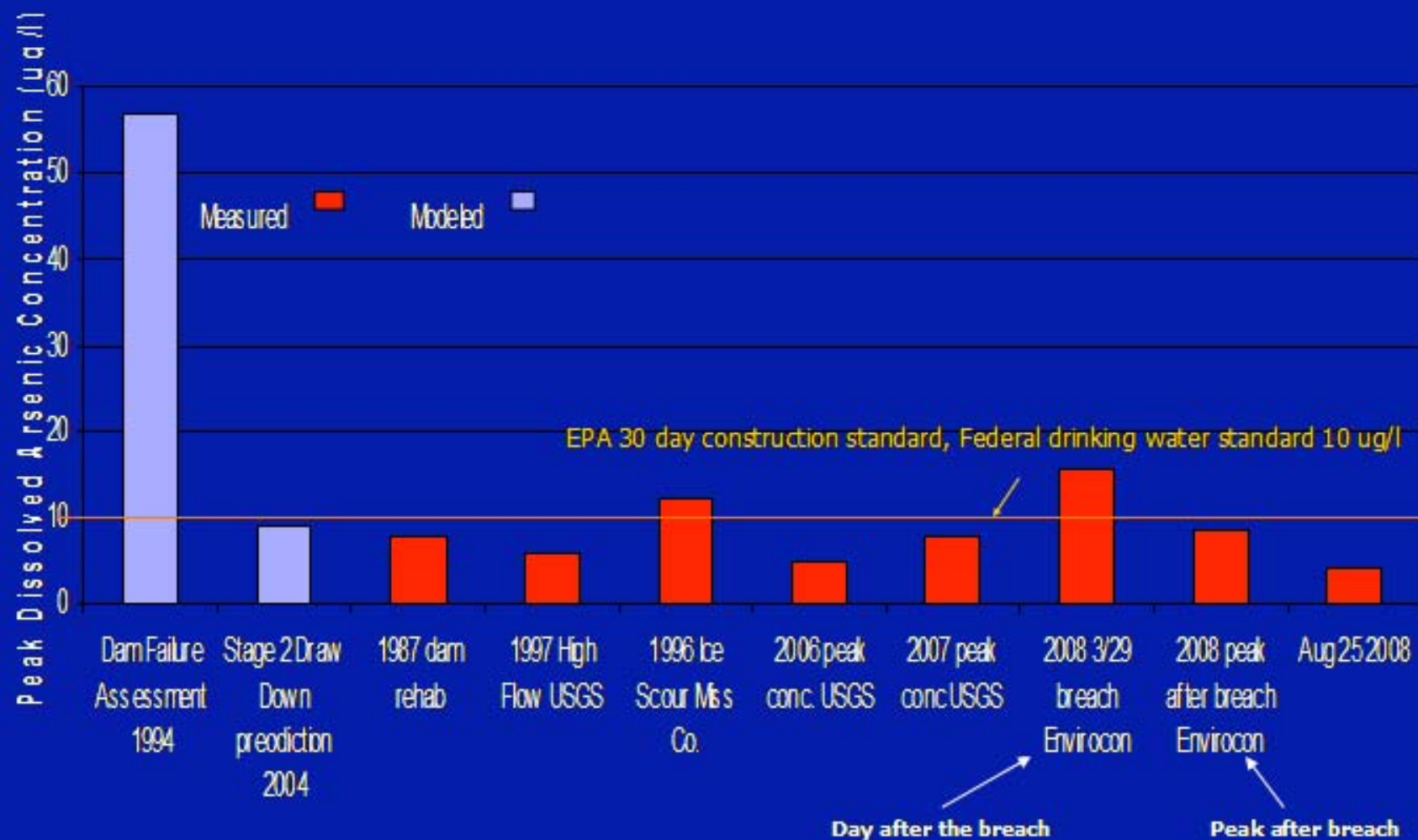
(There is substantial uncertainty in the
apportionment of this contribution
between RPA and SAA 4 & 5)

**PROVISIONAL INFORMATION;
SUBJECT TO REVISION**

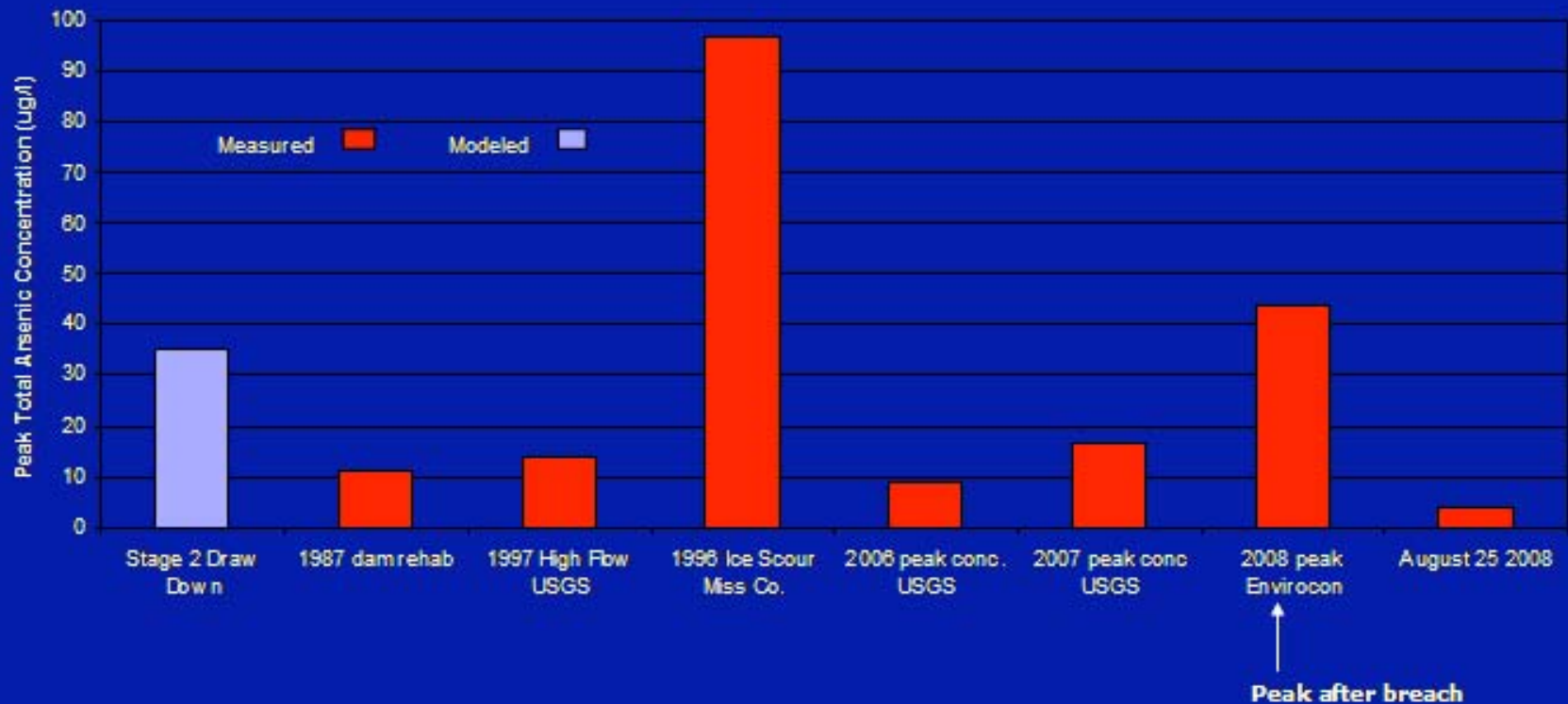
What do all these numbers mean?

How do the concentration of Arsenic, Copper and Total Suspended Solids (TSS) compare with other years?

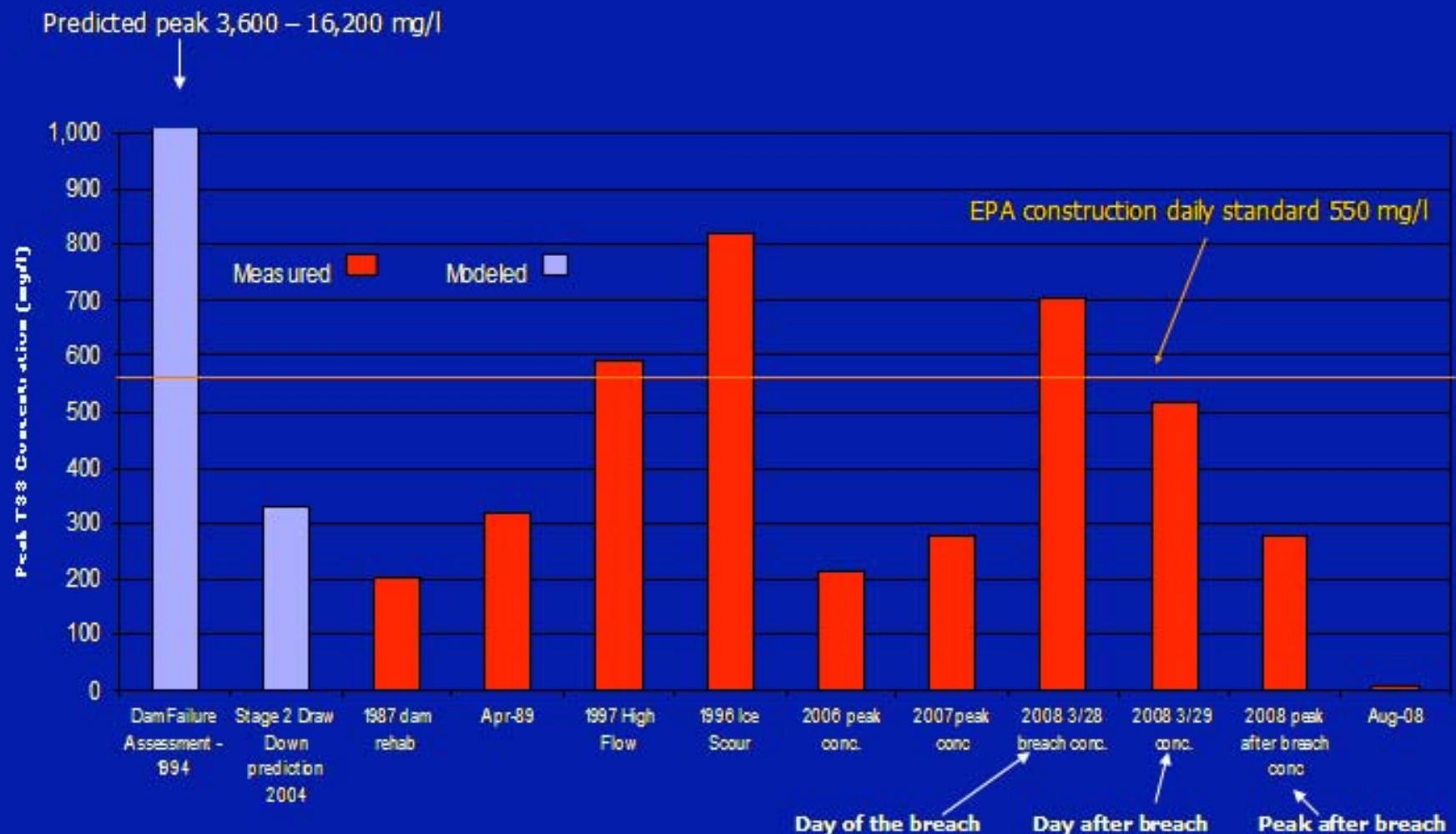
Dissolved Arsenic Concentration Predicted and Measured (micrograms/L)



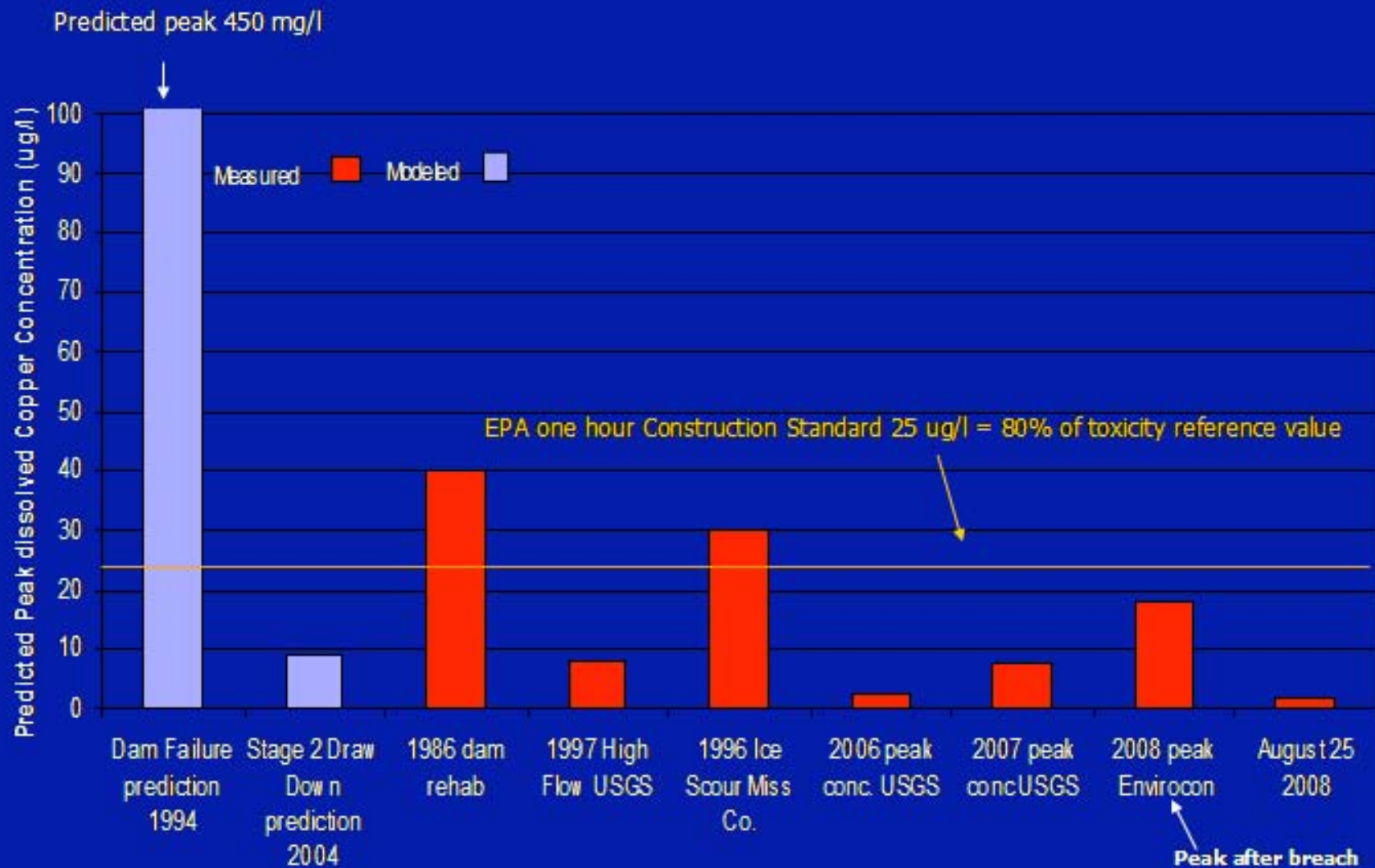
Total Arsenic Concentration Predicted and Measured (micrograms/L)



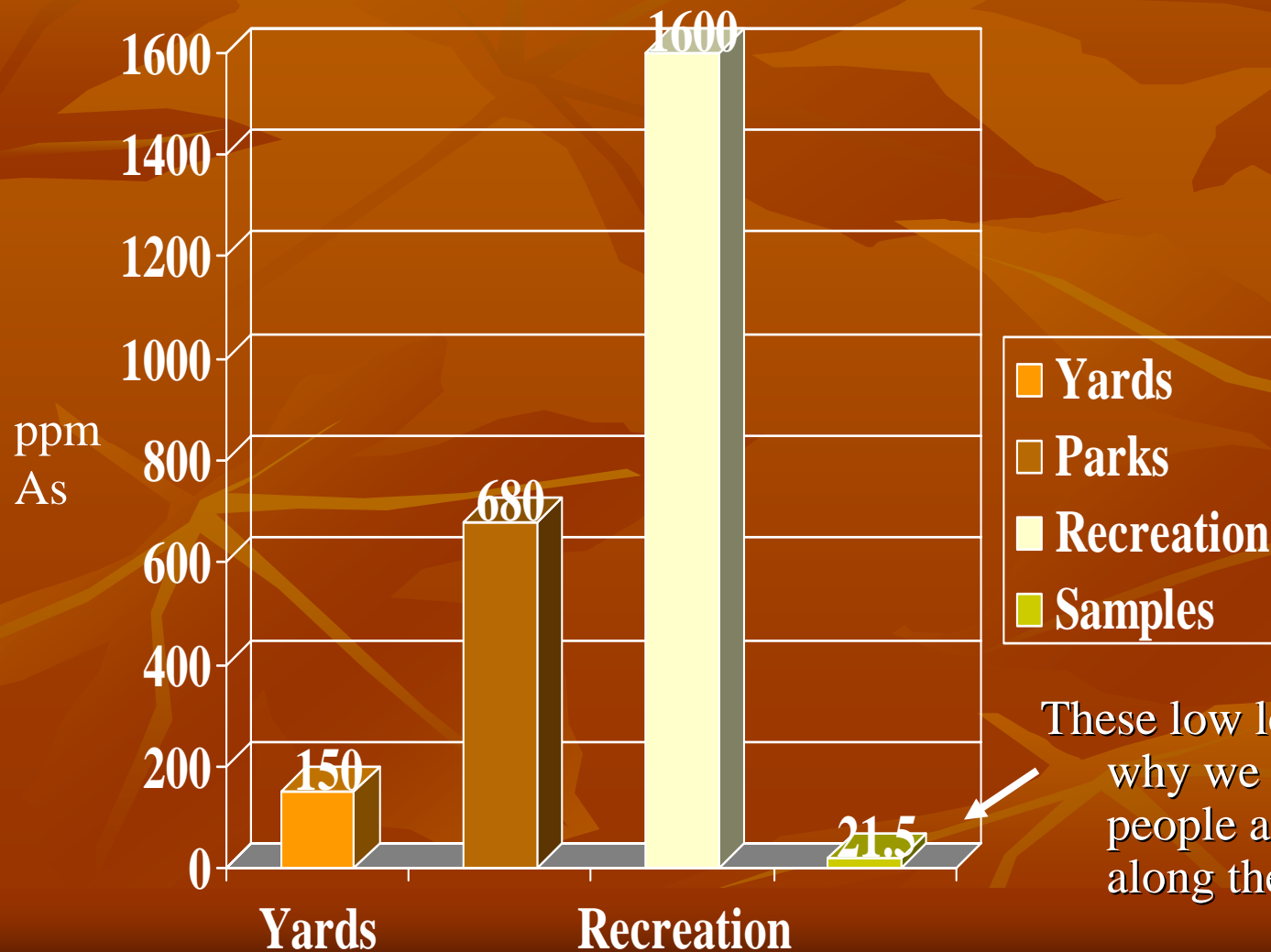
Total Suspended Sediment Concentration Predicted and Measured (mg/L)



Dissolved Copper Concentration Predicted and Measured (micrograms/L)



Why it's safe to recreate along the Clark Fork River

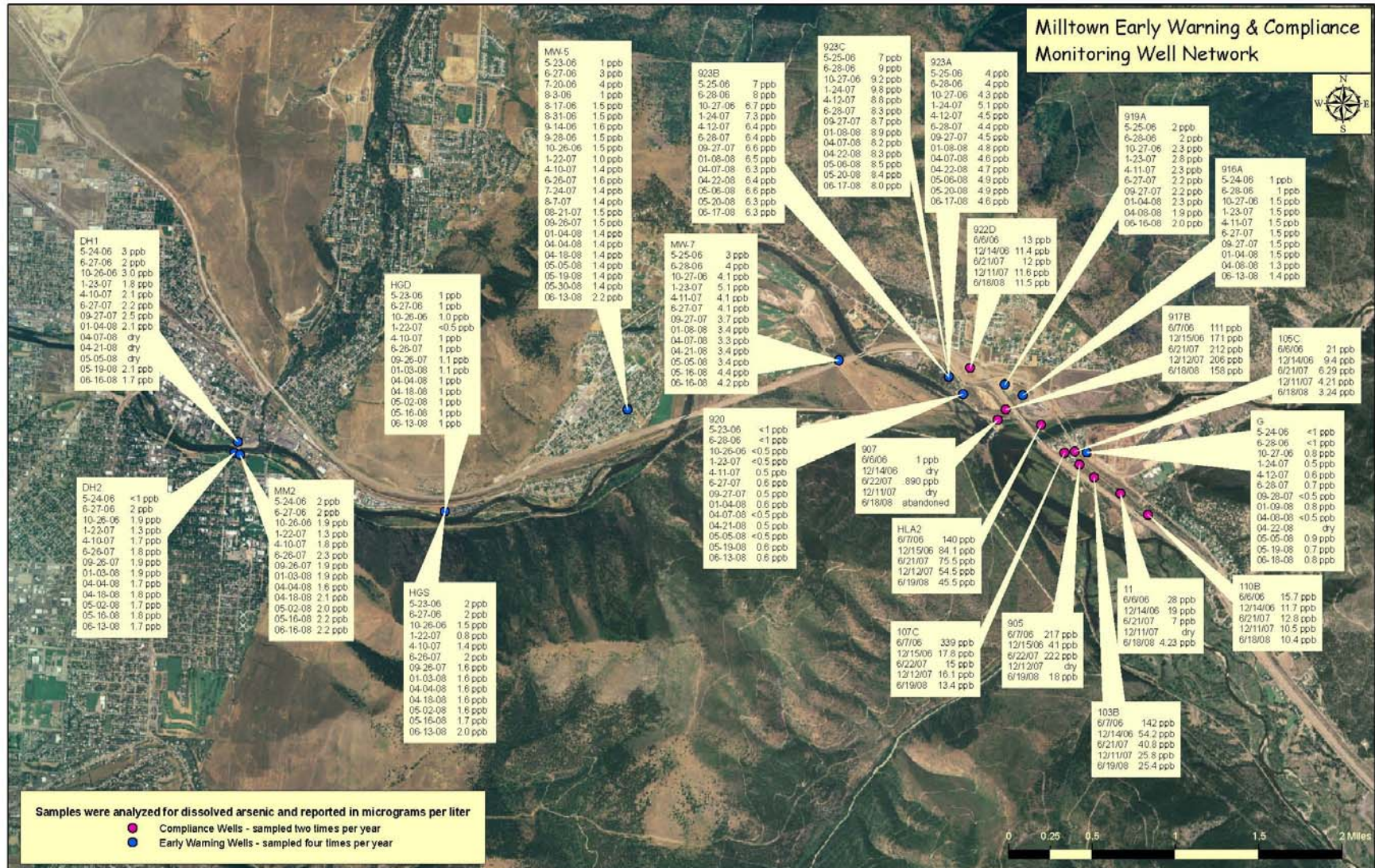


These low levels of arsenic are why we say it's safe for people and pets to recreate along the Clark Fork River.

No impact on Missoula's drinking water

- Maximum 15.5 ppb Arsenic in CFR on 3/29/08
 - Occurred due to pore water drainage – not scouring
 - Triggered 2 months of sampling in early warning monitoring wells along CFR
 - No increase in Arsenic levels in these wells
- Saw significant decreases in Arsenic in wells near the former reservoir reducing Arsenic loading to Missoula aquifer
- Cleanup does not pose a risk to Missoula's water supply; in fact it is safer because of decreased arsenic loading from former reservoir

Early Warning and Compliance Monitoring Well Network



Water Quality Trends – Compliance Monitoring Wells



Fish: Monitoring the effects of dam and sediment removal in 2008*

- Water sampling
- *In situ* juvenile fish bioassays (caged fish)
- Adult trout movement, avoidance and mortality
- Fish population monitoring

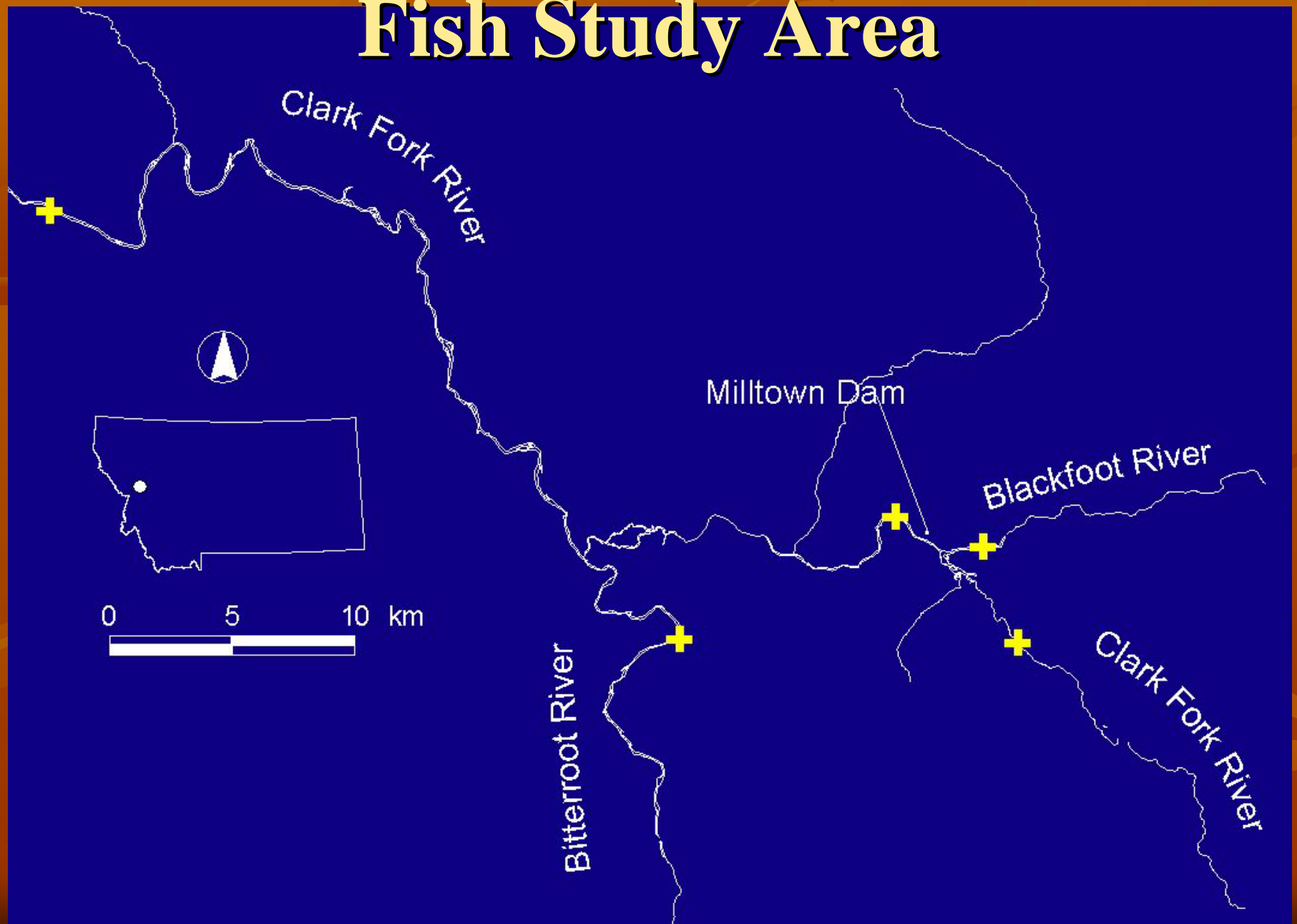


*Information provided by FWP

Overall Results of Fish Studies: 2008

- Impacts observed in area between former dam and Bitterroot River
- Minimal project-related impacts below Bitterroot
- Decreased fish densities below Dam to Bitterroot
- Significant fish passage; increased fish populations upstream of former dam on Clark
- Changes in fish densities: decreased below former dam; increased above (mortality and/or movement?)

Fish Study Area



Caged fish results: 2008

- **Less mortality than in Stage 1**
- **Greater downstream of dam, but similar to Blackfoot**
- **In all years, effects restricted mainly upstream of Bitterroot**
- **Drawdowns caused a significant stress to fish**
 - **Not a source of acute mortality or toxicity**
- **Mortality caused by cumulative effects of many stressors including:**
 - **sediment quantity**
 - **sediment composition**
 - **water temperature**

Radio telemetry- movement and mortality: 2008

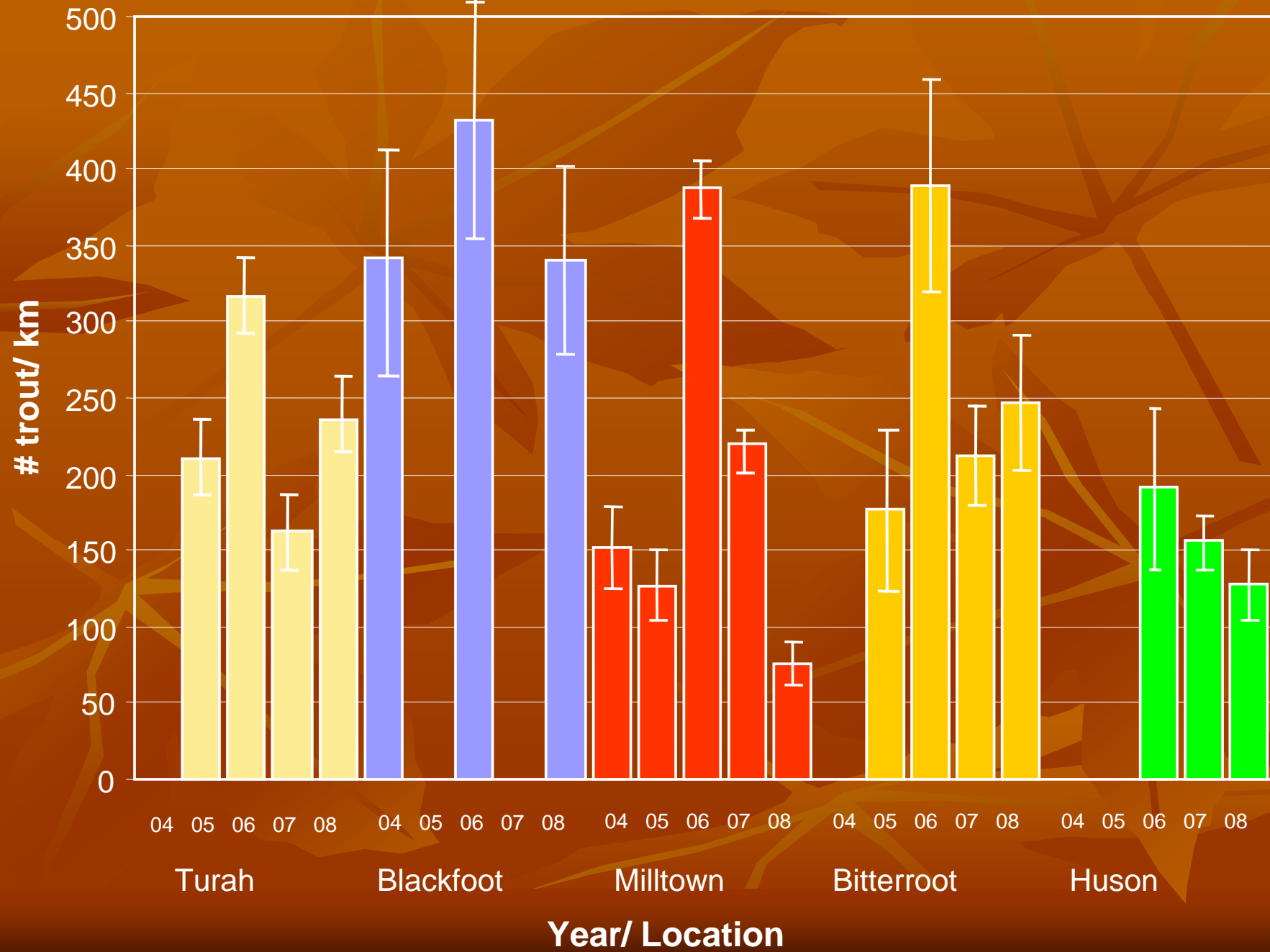
- **More movement in Milltown Section**
- **Mortality less than in past, but greater than control**



Population Density Monitoring: 2008

- **Increase at Turah (and likely Blackfoot)**
- **Decline in Milltown**
- **No change in Huson**
- **Slight increase in Bitterroot**

Trout densities (> 175 mm)



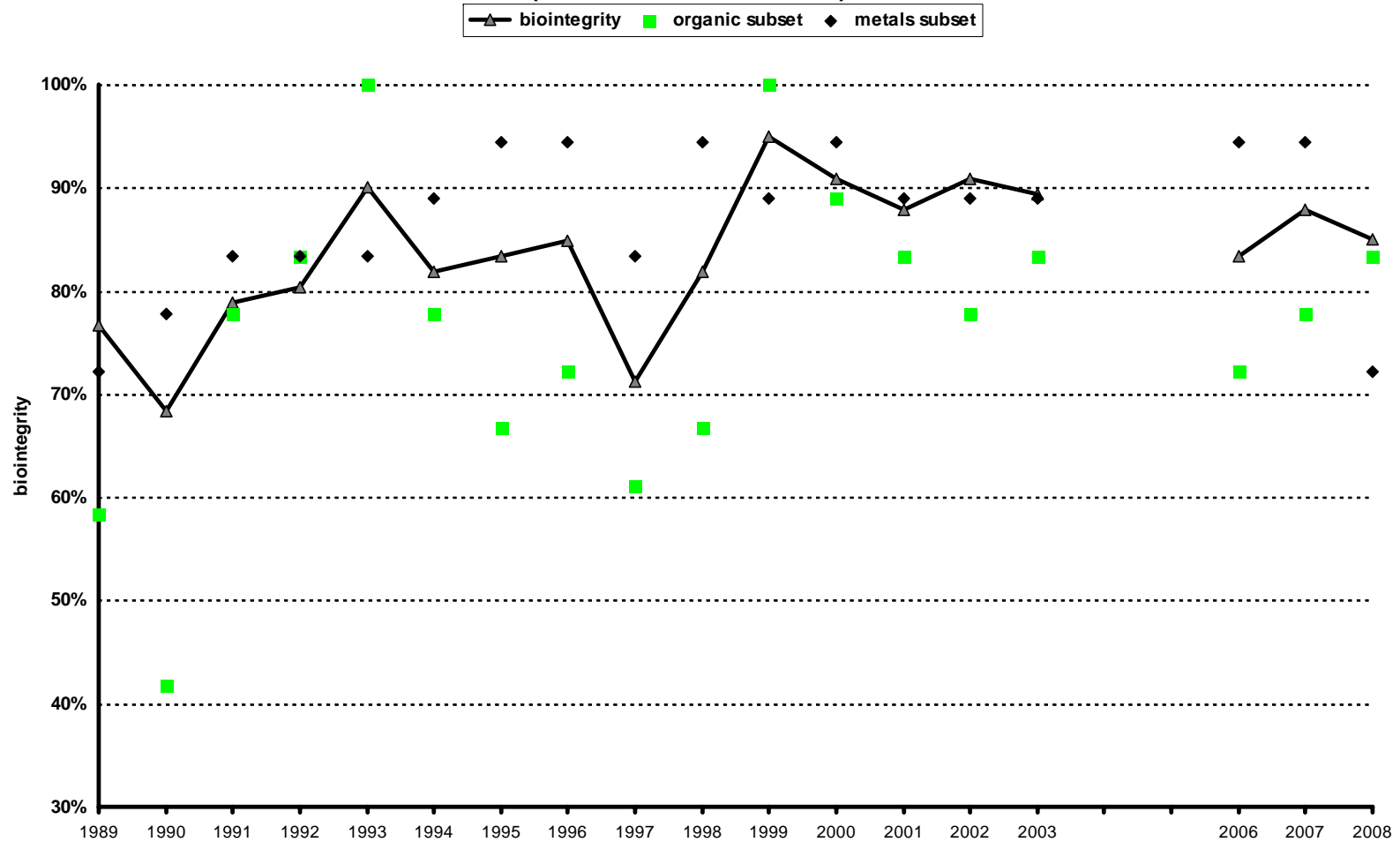
Stage 2 drawdown Impacts (2008)

Macro-invertebrates (bugs)

- Significant impact on macro-invertebrate density between the dam and the Bitterroot; everything is normal below the Bitterroot River
- Population was about 30% of norm
- Bio-integrity was slightly impaired
- Diversity was near normal
- Author believes drop in population was due to “habitat alteration” from sand deposition in riverbed

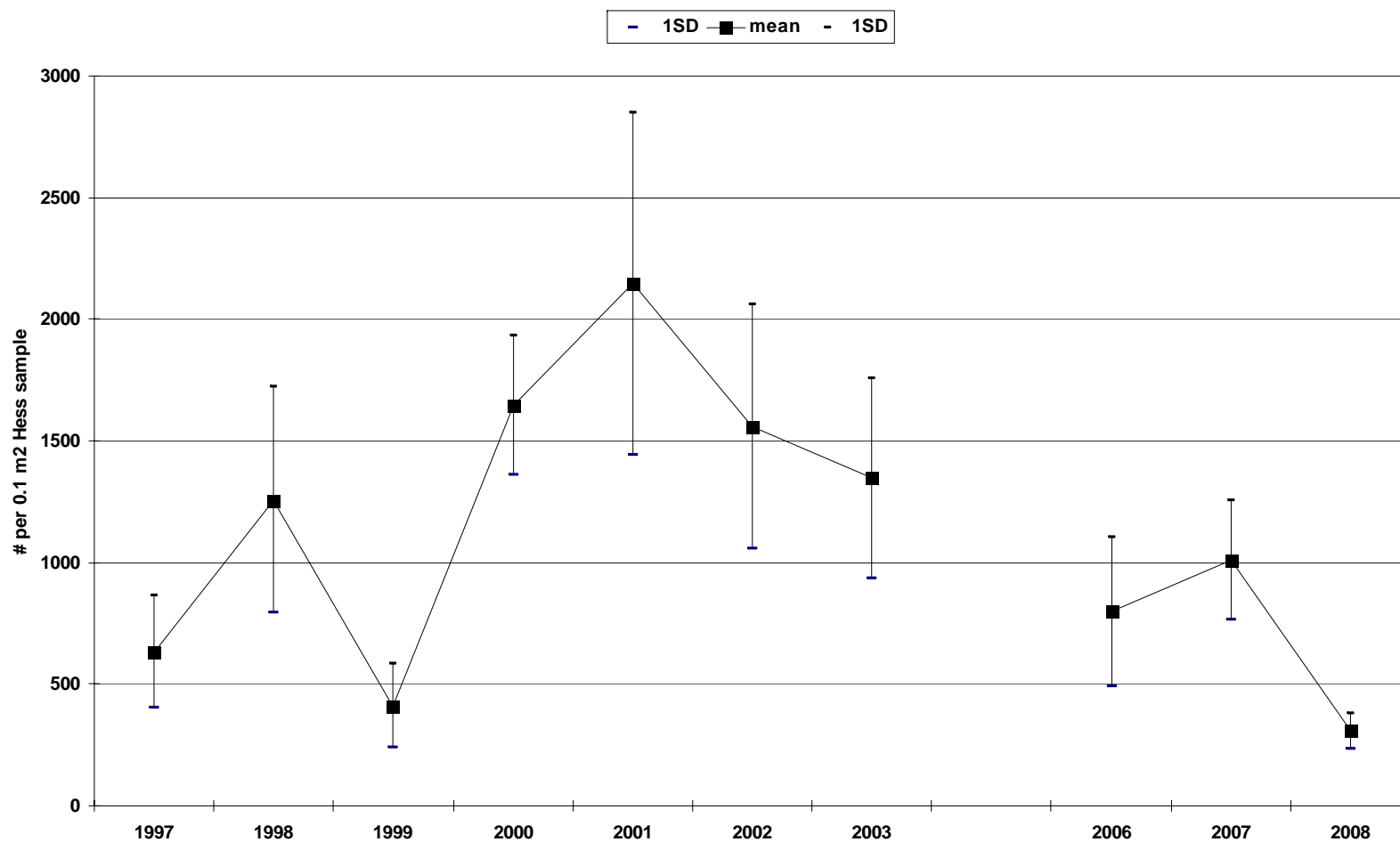
Macro-invertebrate Bio-integrity

Figure 2. Macroinvertebrate community biointegrity in the Clark Fork River above Missoula (ShaRon FA station 15.5) 1989-2008.



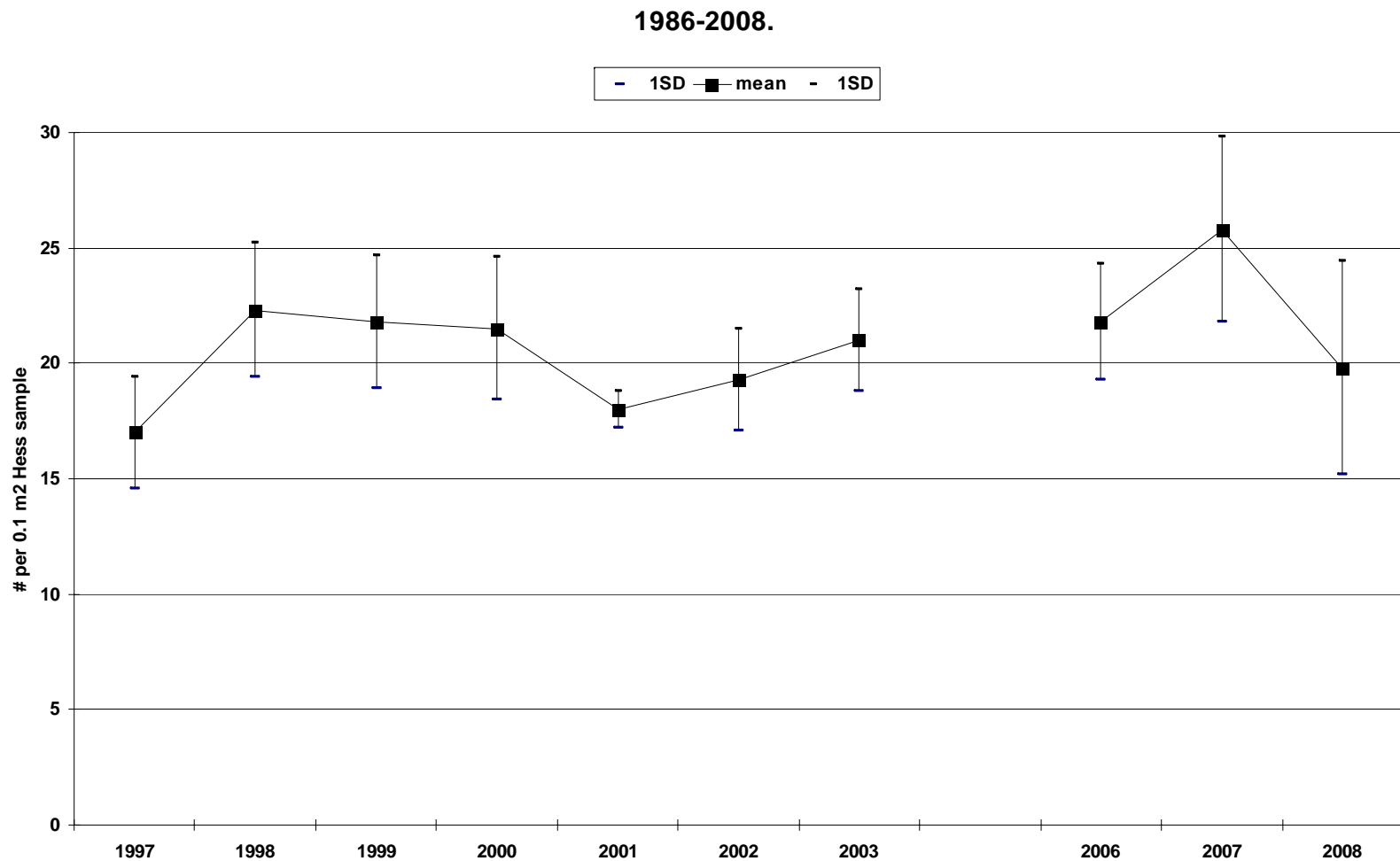
Macro-invertebrate Density 1997-2008

Figure 3. Macroinvertebrate community density in the Clark Fork River below Milltown Dam (ShaRon F.A. - station 15.5) August, 1986-2008.



Diversity of Aquatic Insects: 1997-2008

Figure 4. Number of EPT taxa (mayflies, stoneflies and caddisflies) per Hess sample below Milltown Dam (ShaRon F.A. - station 15.5) August, 1997-2008



Cleanup Update:

Dam and Sediment Removal, Wells and Groundwater, and Bridges



Sediment Removal

- Removed over 1.5 million tons to date
- Slightly over half done
- Expect to be finished with excavation next October
- If SAA 3b sediments are removed, excavation will take an additional 3 mos.



Dam Removal and Spillway Cofferdam Breach

- Spillway removal finished in 6 weeks
- Spillway coffer dam breach should occur in late November
- Divider Block removal may be finished before the spillway coffer dam breach; may wait until after breach
- Expect 2 feet of additional drop in the river at the dam; minimal impact to area wells



October 10, 2008



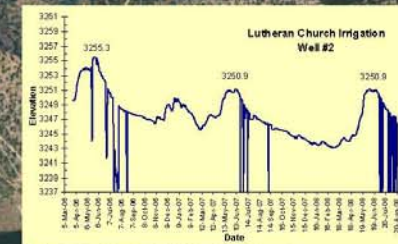
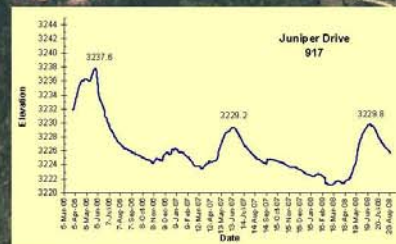
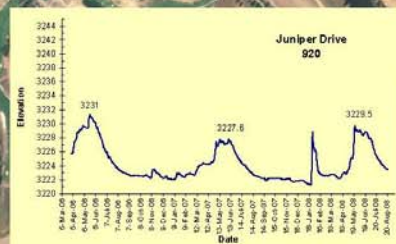
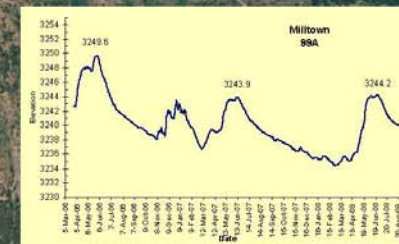
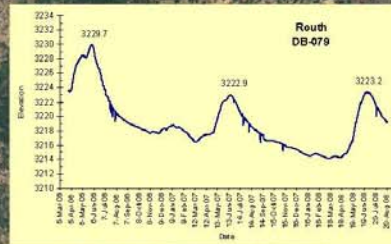
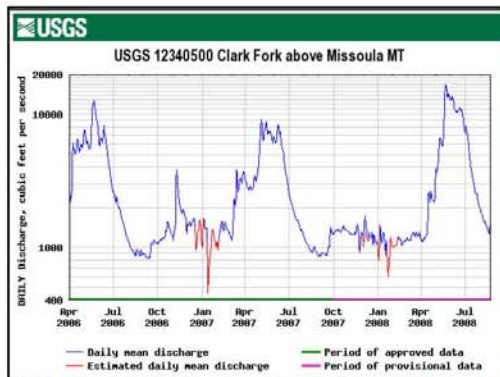
Spillway Cofferdam



Wells and Groundwater

- Only reduced (or no change) arsenic concentrations in wells close to the site and no changes in wells downstream of the site
- No significant drop in water levels in wells following the Stage 2 drawdown (model predicted about 3-4 feet in West Riverside)
- Expect no significant drop in water levels following the Stage 3 drawdown
- Well replacement program is still up and running; will continue for next several years

Water Level Trends



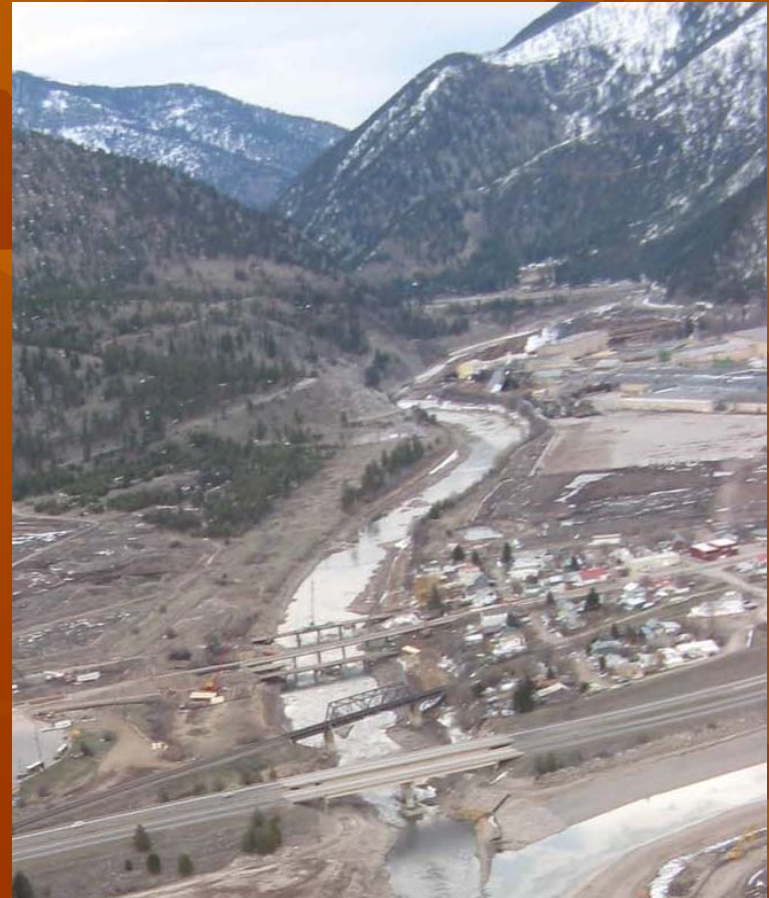
Water Level Changes through August 21, 2008



0 500 1,000 2,000 3,000 4,000 Feet

Bridges – Progress Update

- I-90
- MRL
- Highway 200
- Pedestrian Bridge



I-90 Bridges

- Center pier work;
Abutment underpinning
and abutment micropile
wall and jet grouting
column installation all
completed
- Final abutment slope
and removal of center
pier skirt will be done
this fall and winter



MRL Bridge

- MRL is responsible for work
- West side pier completed in early spring 2008
- East Side pier is scheduled for this fall
- Will access east bank with a temporary bridge to be installed in the next few weeks
- Work involves removal of native alluvium around pier and replacement with large rip rap

Highway 200 Bridge

- Installing decking and paving
- Should be completed in mid-November 2008



New Pedestrian Bridge

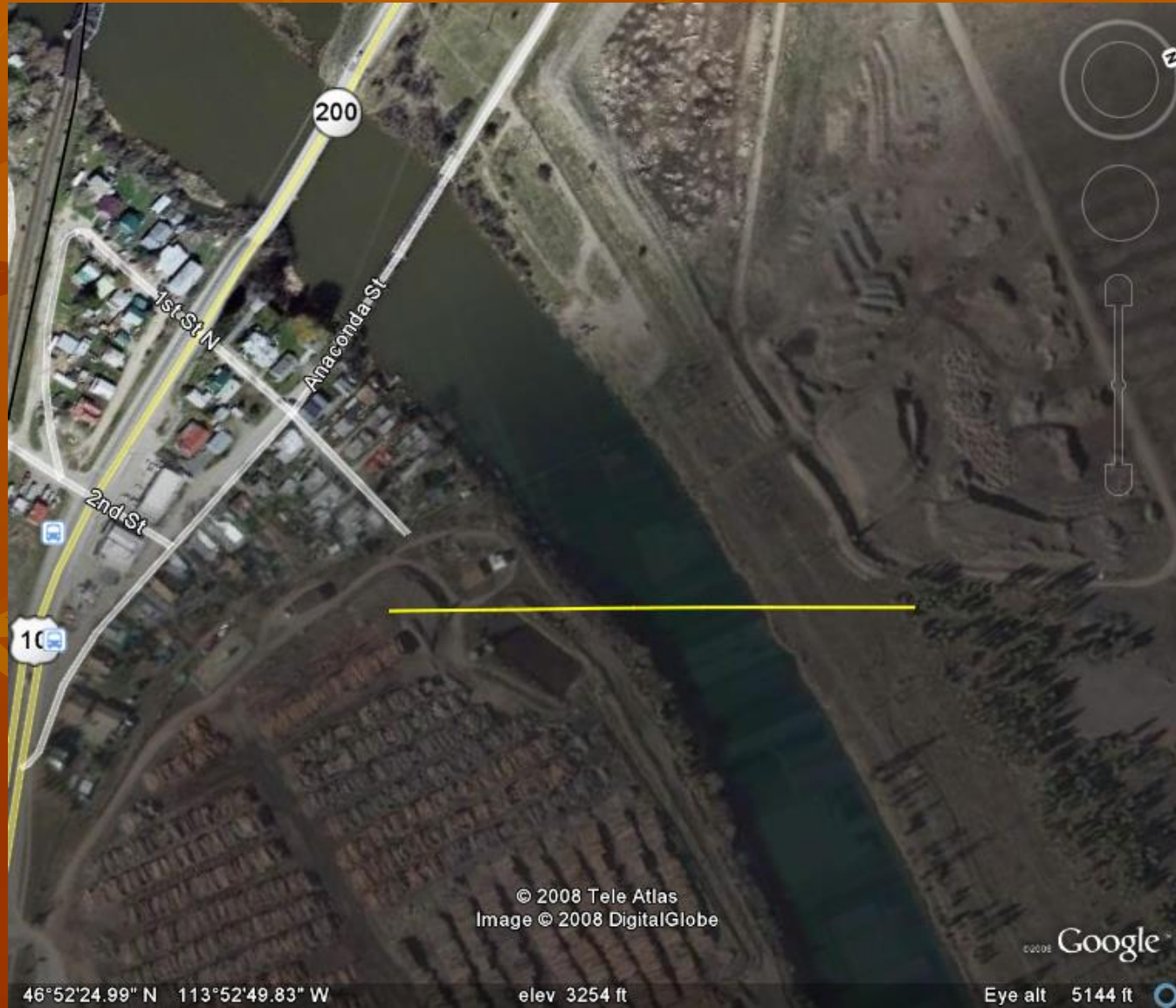


Pedestrian Bridge

- Approach spans were installed last Friday
- Bridge should be open for foot traffic in mid-November 2008



Blackfoot River 8" Natural Gas Pipeline Crossing

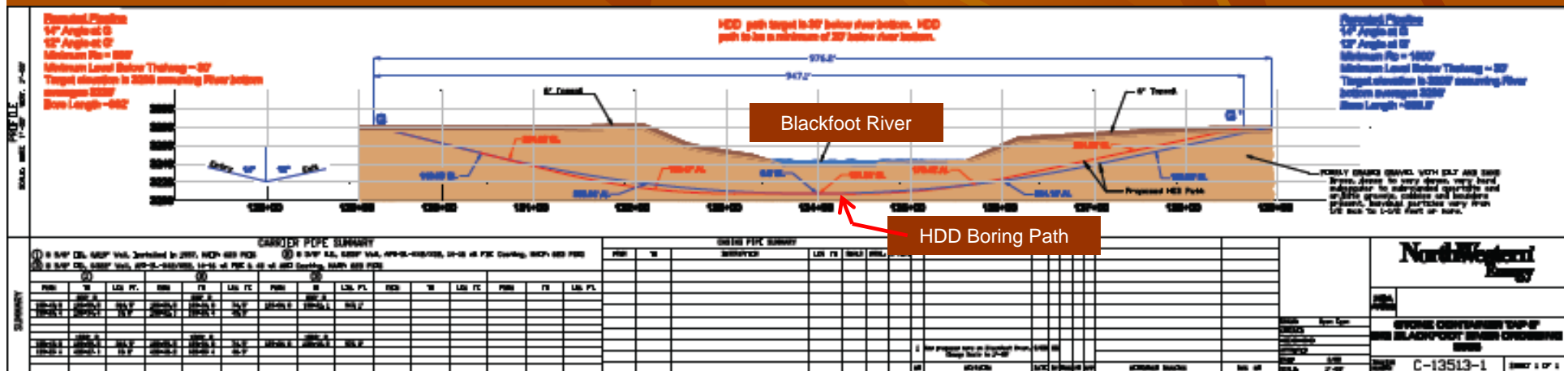


Gas Pipeline Replacement

- Original pipeline became exposed had to be shut down and replaced with another line
- NWE was not able to get that pipeline to design depth
- Planning to put final replacement line in by directional drilling starting later in October
- Will be place 20 feet under the river
- If directional drilling doesn't work they will trench in a new line in November – Must be at least 6 feet below general scour depth

- HDD target path is 30 feet below river bottom with a minimum depth requirement of 20 feet below river bottom.

HDD Installation Profile



Schedule Outline

(subject to change)

**Site Prep and Pipe Construction (weld, test, x-ray, coat):
October 6 to October 10**

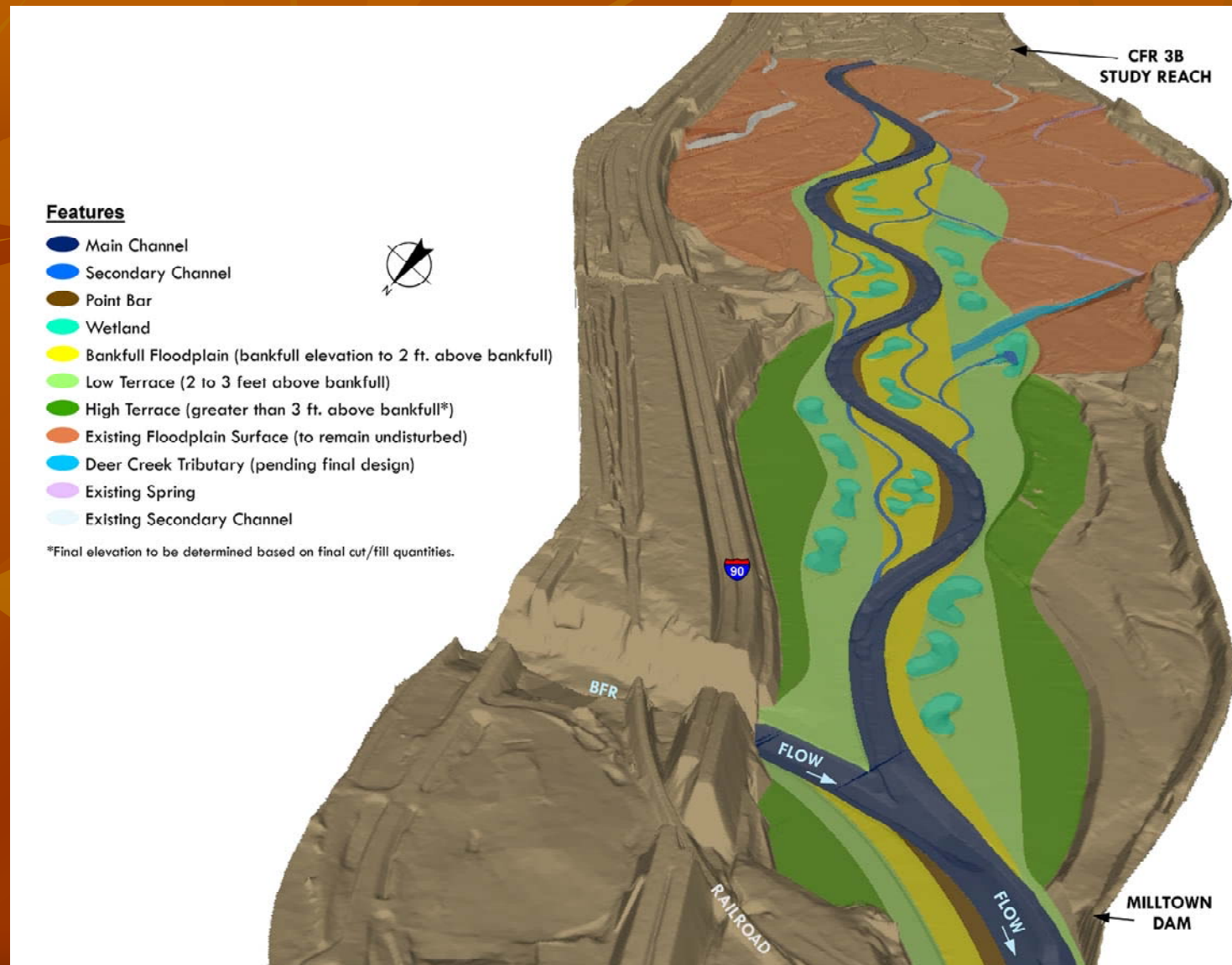
**HDD Contractor Mobilization and Setup:
October 15 to October 22**

**South Bank Flow Deflector/Rip rap removal (existing crossing):
October 15 to October 24**

**Drilling and Pipe Installation:
October 22 to November 5**

**Demobilization, Old Pipe Removal and Restoration:
November 5 to November 12**

Restoration



Restoration Activities

- LIDAR Survey - upstream floodplain surfaces and water surface gradients close to restoration design surfaces
- Weed Control
 - Summer mowing
 - Fall spraying / planting

Log and Timber Crib Removal

- NRD program funding
- Log Removal
 - Began week of 10/13/08
 - Similar to work done in 2006
 - Taking out an estimated 3500 logs
 - Most of the logs will be used in the restoration floodplain
 - Contractor is Lloyd Bache Company of Plains, MT
- Timber Crib Removal
 - Begins week of October 27
 - Contractor is Cattracks of Stevensville, MT



Restoration Activities

- Site Preparation Planting
 - Upstream of Duck Bridge planting starting October 20
 - Downstream seeding end of October
- Upstream Reach CFR 3B construction early winter 2008/2009
- Upstream Reach CFR 3A floodplain construction Spring / Summer 2009

Restoration Activities

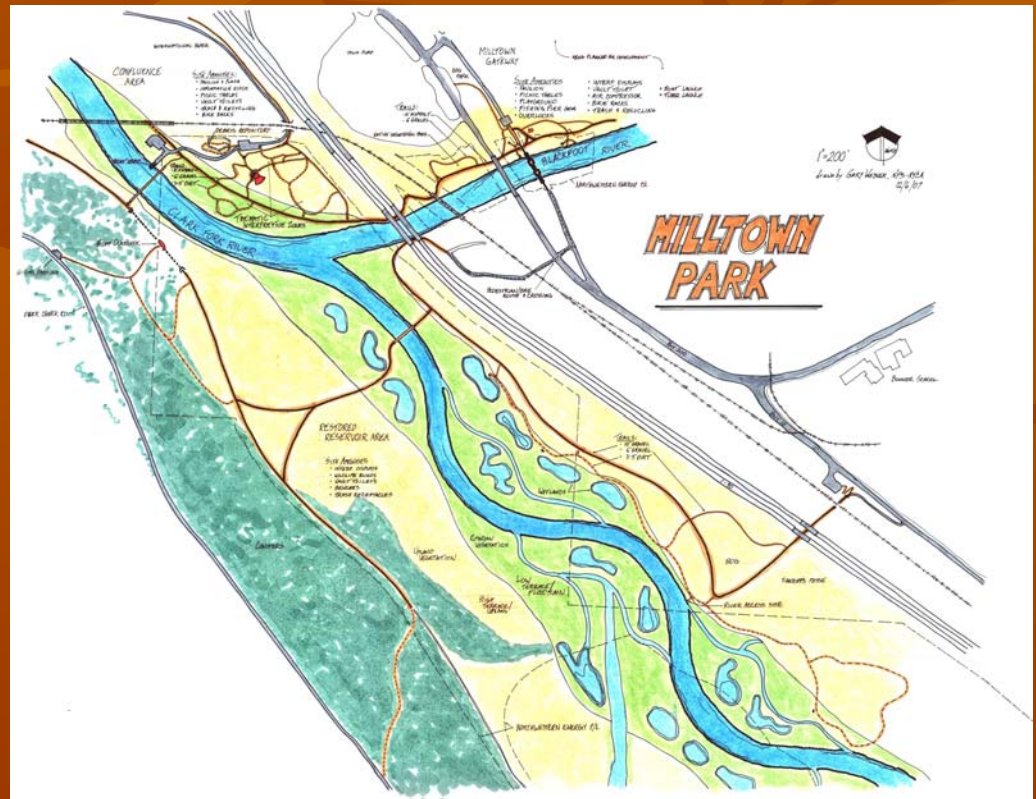
- Land / Water Rights Acquisition
 - NorthWestern Corp. and State working on transfer.
- SAA 3B sediment removal: State negotiating with AIG for removal.

SAA IV & V Erosion

- State (with EPA review) looking at measures to decrease loss of sediment in restoration area upstream of Duck Bridge (Areas 4 & 5)
- Possible Measures:
 - Sediment removal
 - Bank armoring/flow deflectors
 - New channel excavation thru 2008 scoured area

Site Redevelopment

- Milltown Redevelopment Working Group
- Updated Redevelopment Plan in July 2008
- Working toward creation of a new MT State Park (Confluence State Park?)
 - Milltown Gateway Area
 - Confluence Area
 - Reservoir Area
- State working with NorthWestern on transfer of its Milltown lands



Overall Project Schedule

- Work to be completed in 2008
 - Highway 200 Bridge
 - Pedestrian Bridge
 - Spillway removal
 - Spillway coffer dam breach

Overall Schedule

- Work to be completed in 2009
 - I-90 abutment slopes (before high flow)
 - SAA 4 & 5 BMP implementation (before high flow)
 - Sediment excavation – October
 - Infrastructure removal
 - Repository closures
 - Floodplain/rough channel construction
 - Remedial Action Completion - late 2009/early 2010 (before high flow 2010)

For more information:

<http://www.epa.gov/region8/superfund/mt/milltown>

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Open Discussion

Thank you!